CLAIMS:

1. A voltage-controlled semiconductor device, comprising:

a first semiconductor layer made of a first conductivity-type wide gap semiconductor having a first electrode on one surface, the first electrode becoming either one of a current inflow terminal and a current outflow terminal for a controlled current;

a second semiconductor layer made of a wide gap semiconductor which is formed on the other surface of the first semiconductor layer and which has a second conductivity-type different from the first conductivity type;

an embedded semiconductor region made of a wide gap semiconductor which is partially provided in a vicinity of an opposite surface of the second semiconductor layer to a surface being in contact with the first semiconductor layer and which has a conductivity type different from that of the second semiconductor layer;

a channel layer made of a wide gap semiconductor which is provided so as to be in contact with the second semiconductor layer and the embedded semiconductor region and which has a conductivity type identical to that of the second semiconductor layer;

a semiconductor region made of a wide gap semiconductor which is provided in the channel layer so as to be overlapped with the embedded semiconductor region and which has a conductivity type identical to that of the channel layer and a dopant concentration larger than that of the channel layer;

a second electrode electrically connected to the embedded semiconductor region and to the semiconductor region, the second electrode becoming a current outflow end when the first semiconductor layer becomes a current inflow end while the second electrode becoming a current inflow end when the first semiconductor layer becomes a current outflow end; and

a control electrode facing the channel layer and the semiconductor region via an insulating film.

2. The voltage-controlled semiconductor device according to Claim 1, further comprising an electric field relaxation region which is provided in the second semiconductor layer between the adjacent embedded semiconductor regions and which has a conductivity type different from that of the second semiconductor layer.

3. The voltage-controlled semiconductor device according to Claim 1,

wherein a portion of the insulating film facing a region between the adjacent embedded semiconductor regions has a thickness larger than other portions.

4. A voltage-controlled semiconductor device, comprising:

a first semiconductor layer made of a first conductivity-type wide gap semiconductor having a first electrode on one surface, the first electrode becoming either one of a current inflow terminal and a current outflow terminal for a controlled current;

a second semiconductor layer made of a wide gap semiconductor which is formed on the other surface of the first semiconductor layer and which has a second conductivity-type different from the first conductivity type;

at least two embedded semiconductor regions made of a wide gap semiconductor which is partially provided in a vicinity of an opposite surface of the second semiconductor layer to a surface being in contact with the first semiconductor layer and which has a conductivity type different from that of the second semiconductor layer;

a channel layer made of a wide gap semiconductor which is provided so as to be in contact with the second semiconductor layer and the embedded semiconductor regions

and which has a conductivity type identical to that of the second semiconductor layer;

a semiconductor region made of a wide gap semiconductor which is provided in the channel layer so as to be overlapped with the embedded semiconductor regions and which has a conductivity type identical to that of the channel layer and a dopant concentration larger than that of the channel layer;

a second electrode electrically connected to the embedded semiconductor regions and to the semiconductor region, the second electrode becoming a current outflow end when the first semiconductor layer becomes a current inflow end while the second electrode becoming a current inflow end when the first semiconductor layer becomes a current outflow end; and

a control electrode facing the second semiconductor layer, the channel layer and the semiconductor region via an insulating film.

5. The voltage-controlled semiconductor device according to Claim 1 or 4,

wherein the first conductivity type is an n type while the second conductivity type is a p type.

6. The voltage-controlled semiconductor device according to Claim 1 or 4,

wherein the dopant concentration of the channel layer is larger than the dopant concentration of the second semiconductor layer.

7. The voltage-controlled semiconductor device according to Claim 1 or 4,

wherein an interval between adjacent embedded semiconductor regions is 3 μm or more.

8. The voltage-controlled semiconductor device according to Claim 4, further comprising an electric field relaxation region which is provided in the second semiconductor layer between the adjacent embedded semiconductor regions and which has a conductivity type different from that of the second semiconductor layer,

wherein the control electrode faces at least a part of the electric field relaxation region via the insulating film.

9. The voltage-controlled semiconductor device according to Claim 1 or 4,

wherein a high-conductivity region is formed inside the channel layer.